

Fig. 1

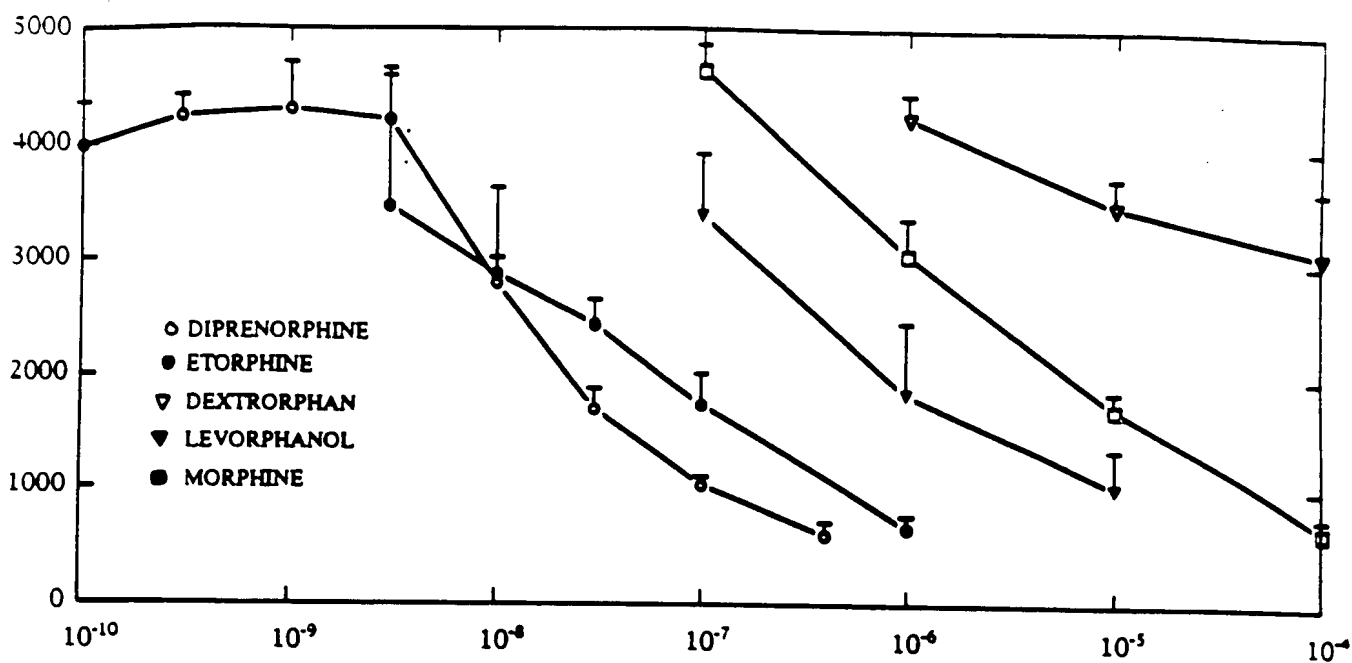


Fig. 2

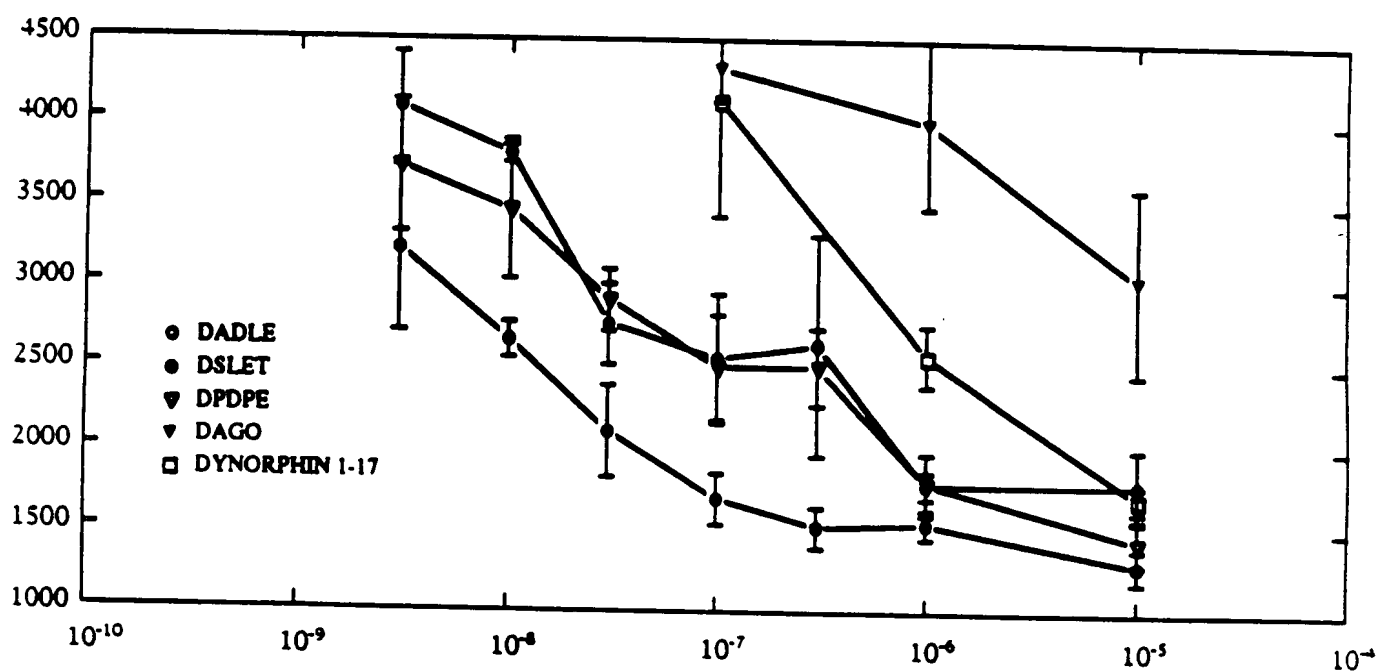


Fig. 3

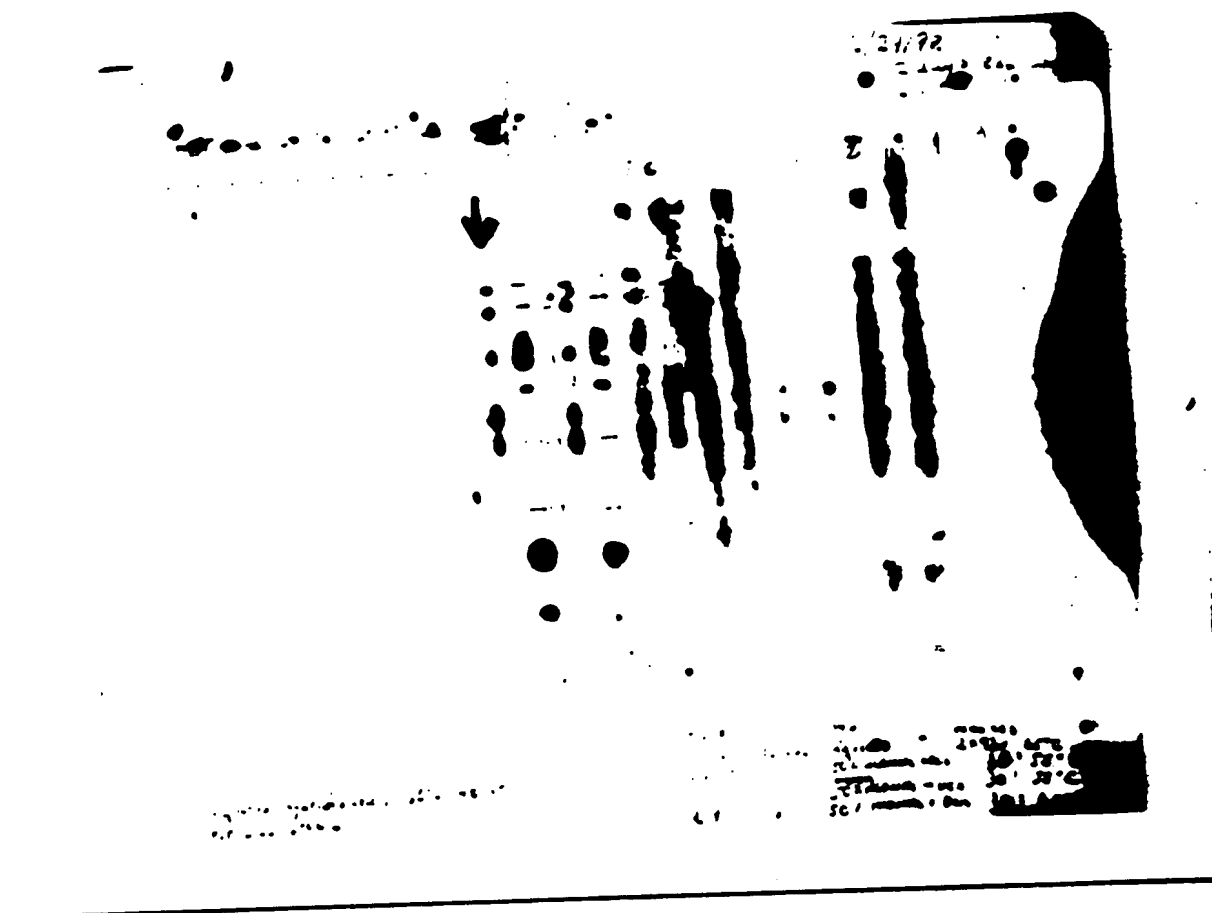


Fig. 4

GCACGGTGGAGACGGACACGGCGCGCCATG GAG CTG GTG CCC TCT GCC CGT GCG GAG CTG CAG TCC TCG CCC C
Met Glu Leu Val Pro Ser Ala Arg Ala Glu Leu Gln Ser Ser Pro L

GTC AAC CTC TCG GAC GCC TTT CCC AGC GCC TTC CCC AGC GCG GGC GCC AAT GCG TCG GGG TCG CCG G
Val Asn*Leu Ser Asp Ala Phe Pro Ser Ala Phe Pro Ser Ala Gly Ala Asn*Ala Ser Gly Ser Pro G

GCC CGT AGT GCC TCG TCC CTC GCC CTA GCC ATC GCC ATC ACC GCG CTC TAC TCG GCT GTG TGC GCA G
Ala Arg Ser Ala Ser Ser Leu Ala Leu Ala Ile Ala Ile Thr Ala Leu Tyr Ser Ala Val Cys Ala V

GGG CTT CTG GGC AAC GTG CTC GTC ATG TTT GGC ATC GTC CGG TAC ACC AAA TTG AAG ACC GCC ACC A
Gly Leu Leu Gly Asn Val Leu Val Met Phe Gly Ile Val Arg Tyr Thr Lys Leu Lys Thr Ala Thr A

ATC TAC ATC TTC AAT CTG GCT TTG GCT GAT GCG CTG GCC ACC AGC ACG CTG CCC TTC CAG AGC GCC A
Ile Tyr Ile Phe Asn Leu Ala Leu Ala Asp Ala Leu Ala Thr Ser Thr Leu Pro Phe Gln Ser Ala L

TAC TTG ATG GAA ACG TGG CCG TTT GGC GAG CTG CTG TGC AAG GCT GTG CTC TCC ATT GAC TAC TAC A
Tyr Leu Met Glu Thr Trp Pro Phe Gly Glu Leu Leu Cys Lys Ala Val Leu Ser Ile Asp Tyr Tyr A

ATG TTC ACT AGC ATC TTC ACC CTC ACC ATG ATG AGC GTG GAC CGC TAC ATT GCT GTC TGC CAT CCT G
Met Phe Thr Ser Ile Phe Thr Leu Thr Met Met Ser Val Asp Arg Tyr Ile Ala Val Cys His Pro V

AAA GCC CTG GAC TTC CGG ACA CCA GCC AAG GCC AAG CTG ATC AAT ATA TGC ATC TGG GTC TTG GCT T
Lys Ala Leu Asp Phe Arg Thr Pro Ala Lys Ala Lys Leu Ile Asn Ile Cys Ile Trp Val Leu Ala S

GGT GTC GGG GTC CCC ATC ATG GTC ATG GCA GTG ACC CAA CCC CGG GAT GGT GCA GTG GTA TGC ATG C
Gly Val Gly Val Pro Ile Met Val Met Ala Val Thr Gln Pro Arg Asp Gly Ala Val Val Cys Met L

CAG TTC CCC AGT CCC AGC TGG TAC TGG GAC ACT GTG ACC AAG ATC TGC GTG TTC CTC TTT GCC TTC G
Gln Phe Pro Ser Pro Ser Trp Tyr Trp Asp Thr Val Thr Lys Ile Cys Val Phe Leu Phe Ala Phe V

GTG CCG ATC CTC ATC ATC ACG GTG TGC TAT GGC CTC ATG CTA CTG CGC CTG CGC AGC GTG CGT CTG C
Val Pro Ile Leu Ile Ile Thr Val Cys Tyr Gly Leu Met Leu Leu Arg Leu Arg Ser Val Arg Leu L

TCC GGT TCC AAG GAG AAG GAC CGC AGC CTG CGG CGC ATC ACG CGC ATG GTG CTG GTG GTG GTG GGC G
Ser Gly Ser Lys Glu Lys Asp Arg Ser Leu Arg Arg Ile Thr Arg Met Val Leu Val Val Val Gly A

TTC GTG GTG TGC TGG GCG CCC ATC CAC ATC TTC GTC ATC GTC TGG ACG CTG GTG GAC ATC AAT CGG C
Phe Val Val Cys Trp Ala Pro Ile His Ile Phe Val Ile Val Trp Thr Leu Val Asp Ile Asn Arg A

GAC CCA CTT GTG GTG GCC GCA CTG CAC CTG TGC ATT GCG CTG GGC TAC GCC AAC AGC AGC CTC AAC C
Asp Pro Leu Val Val Ala Ala Leu His Leu Cys Ile Ala Leu Gly Tyr Ala Asn Ser Ser Leu Asn P

GTT CTC TAC GCC TTC CTG GAC GAG AAC TTC AAG CGC TGC TTC CGC CAG CTC TGT CGC ACG CCC TGC G
Val Leu Tyr Ala Phe Leu Asp Glu Asn Phe Lys Arg Cys Phe Arg Gln Leu Cys Arg Thr Pro Cys G

CGC CAA GAA CCC GGC AGT CTC CGT CGT CCC CGC CAG GCC ACC ACG CGT GAG CGT GTC ACT GCC TGC A
Arg Gln Glu Pro Gly Ser Leu Arg Arg Pro Arg Gln Ala Thr Thr Arg Glu Arg Val Thr Ala Cys T

CCC TCC GAC GGC CCG GGC GGT GGC GCT GCC GCC TGA CCTACCCGACCTTCCCCTTAAACGCCCCCTCCCAAGTGAAGT
Pro Ser Asp Gly Pro Gly Gly Gly Ala Ala Ala ***

CAGAGGCCACACCGAGCTCCCTGGGAGGCTGTGGCCACCACCAGGACAGCTAGAATTGGGCTGCACAGAGGGGAGGCCTCCTGTGGGG
GGCCTGAGGGATCAAAAGGCTCCAGGTTGGAACGGTGGGGGTGAGGAAGCAGAGCTGGTGATTCTAAACTGTATCCATTAGTAAGGCTT
AATGGGACAGAGCCTCCGCTTGAGATAACATCGGGTTCTGGCCTTTTGAACACCCAGCTCCAGTCCAAGACCCAAGGATTCCAGCTC
AACCAGGAGGGGCACTGATGGGGTCGATGATTTGGTTTGGCTGAGAGTCCCAGCATTTGTGTTATGGGGAGGATCTCTCATCTTAGAGA
AAGGGGACAGGGCATTCAGGCAAGGCAGCTTGGGGTTTGGTCAGGAGATAAGCGCCCCCTTCCCCTTGGGGGGAGGATAAGTGGGGGATG
ACGTTGGAGAAGAGTCAAAGTTCTCACCACCTTTCTAACTACTCAGCTAAACTCGTTGAGGCTAGGGCCAACGTGACTTCTCTGTAGAG
TACAAGCCGGGCCTGATGGGGCAGGCCTGTGTAATCCAGTCATAGTGGAGGCTGAGGCTGGAAAATTAAGGACCAACAGCCCGG

Fig. 5

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      *20      *      40
MELVPSARAELQSSPLVNLSDAFFPSAFPSAGANASGSPGARSAS--SLALATAITALYSA
      .....
MELTSEQFNGSQVWIPSPFDLNGSLGPSNGSNQTEPYDMTSNAVLTFTYFV

60      80      100
VCAVGLLGNVLMFEGTVRYTKLKTATNTYIENLALADALATSTLPFQSAKYLMETWPFGE
.....
VCVVGLCGNTLVITYVILRYAKMTITNTYILNLALADELFMLGLPFLAMQVALVHWPF GK

120      140      160
LLCKAVLSIDYNNMETSLETLTWMSVDRIYAVCHPVKALDFRTPAKAKLINICTWVLASG
.....
AICRVVMTVDGINQFTSIFCLTVMSIDRYLAVVHPIKSAKWRPRTAKMINVAVWGVSL L

180      200      220
VGVPIMVMAVTOFRD-GAVVCMLOFPSPSWYWDTVTKICVPLEAFVWPIILITVCYGLML
.....
VILPIMTYAGLRSNQWGRSSCTINWPGESGAWYTGFIITYAFILGLVPLTIICLCYLFII

240      260      280
LRLRSVRLLSGSKEKDRSLRRITRMVWVWGAFFVVCWAPIHIEVTVWTLVDINRRDPLVY
.....
IKVKSSGIRVGSSKRRKSEKVTMVSIVWAVFIFCWLPFYIFNVSSVSVAIS-PTPALK

300      320      340
AALHLCIALGYANSSLNPFVLYAFLDENFKRCFRQ-LCRTPCGRQEPGSLRRPRQATTRE R
.....
GMFDFWILTYANSCANPILYAFLSDNFKRSFQNVLCCLKVSGAEDGERSDSKQDKSRLN

360      370
VTACTPSDGPGGGAAA

ETTETQRTLLNGDLQTSI

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Fig. 6.

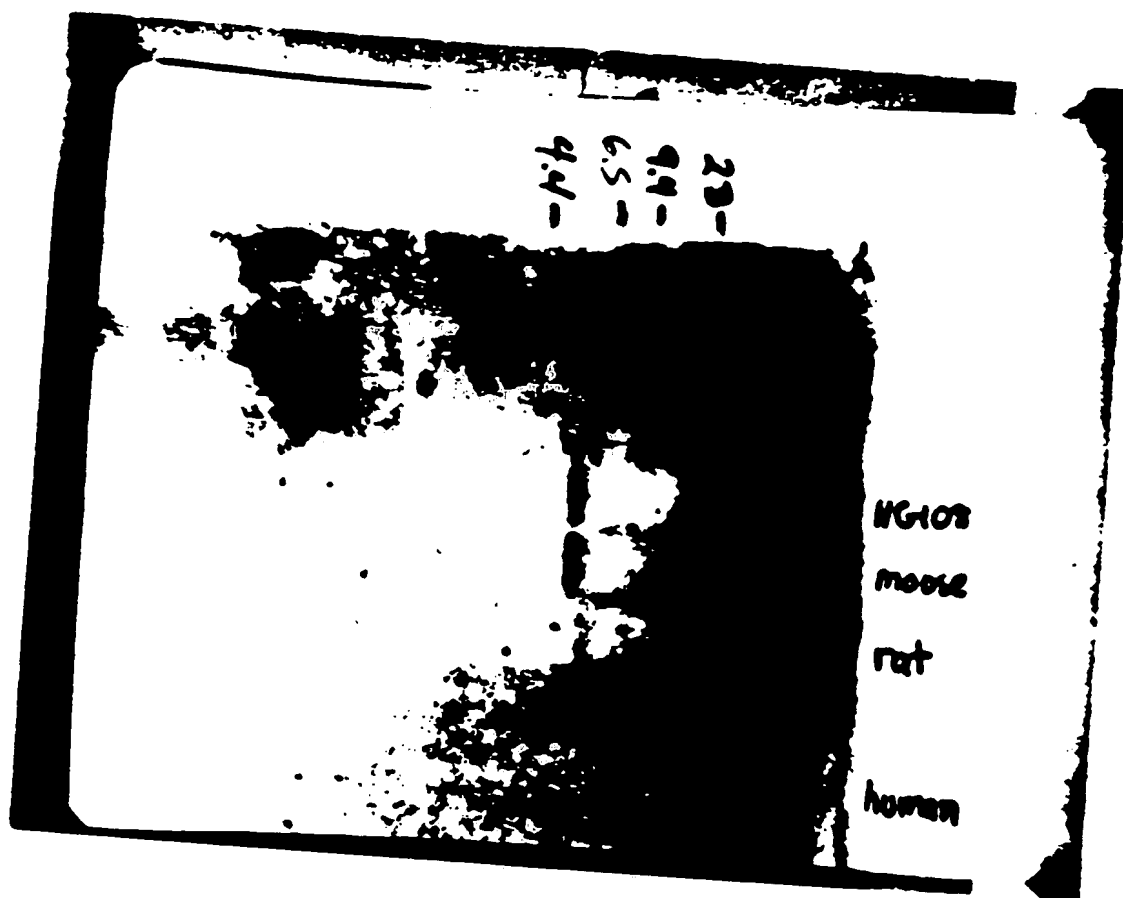


Fig. 7

HUMAN DELTA

Sequence Range: -131 to -1

		-122		-112		-102		-92		-82								
		*		*		*		*		*								
Tuyet's H3	-GG	GCA	GTG	GTG	TGC	ATG	CTC	CAG	TTC	CCC	AGC	CCC	AGC	TGG	TAC	TGG	GAC	ACG
DOR-1	610			620		630		640		650		660						
[478]	gGt	GCA	GTG	GTA	TGC	ATG	CTC	CAG	TTC	CCC	AGt	CCC	AGC	TGG	TAC	TGG	GAC	ACT>
	-^v	^^^	^^^	^^v	^^^	^^^	^^^	^^^	^^^	^^^	^^v	^^^	^^^	^^^	^^^	^^^	^^^	^^v
		-72		-62		-52		-42		-32								
		*		*		*		*		*								
Tuyet's H3	GTG	ACC	AAG	ATC	TGC	GTG	TTC	CTC	TTC	GCC	TTC	GTG	GTG	CCC	ATC	CTC	ATC	ATC
DOR-1			670		680		690		700		710							
[478]	GTG	ACC	AAG	ATC	TGC	GTG	TTC	CTC	TTt	GCC	TTC	GTG	GTG	CCg	ATC	CTC	ATC	ATC>
	^^^	^^^	^^^	^^^	^^^	^^^	^^^	^^^	^^v	^^^	^^^	^^^	^^^	^^v	^^^	^^^	^^^	^^^
		-22		-12		-2												
		*		*		*												
Tuyet's H3	ACC	GTG	TGC	TAT	GGC	CTC	ATG	CT										
DOR-1		720		730														
[478]	ACg	GTG	TGC	TAT	GGC	CTC	ATG	C>										
	^^v	^^^	^^^	^^^	^^^	^^^	^^^	^										

Figure 8a

CCT GGC CTT TTG GGG ATG TGC TGT GCA AGA TAG TAA TTT CCA TTG
 50 60 70 80 90
 ATT ACT ACA ACA TGT TCA CCA GCA TCT TCA CCT TGA CCA TGA TGA
 100 110 120 130
 GCG TGG ACC GGT ACA TTG CCG TGT GCC ACC CCG TGA AGG CTT TGG
 140 150 160 170 180
 ACT TCC GCA CAC CCT TGA AGG CAA AGA TCA TCA ATA TCT GCA TCT
 190 200 210 220
 GGC TGC TGT CGT CAT CTG TTG GCA TCT CTG CAA TAG TCC TTG GAG
 230 240 250 260 270
 GCA CCA AAG TCA GGG AAG GTA AGA GCA GTC ATT TCA TTC TGT TCA
 280 290 300 310
 TAA AAA TGT AGC TTC AAA TTA CAT AGA CTT TTA ATT TGA GCG TGA
 320 330 340 350 360
 GTA GGC CAC ATA TTT GTG GAA ATC GAT GCC AAA AGA CGA CGG AAA
 370 380 390 400
 TGT AGT GCC TAA ATC CAT GGA AGA TGA GAA GTA GAA CAA TTT TTT
 410 420 430 440 450
 GTC CCT TTC CAC CTC TAA ACA CAG AAT GCA ATA ATG ACA TTG CCA
 460 470 480 490
 GAA GAG AGA TGC CCG ACC TGT CTC CCA TTC TGG CAA TGT TTA GTA
 500 510 520 530 540
 GAA AGT GGA GGG GTG AGG ATG AGG TAA GAA CCA CAG GCA TGT AGA
 550 560 570 580
 TTT TAA AGT ACA ACC TGG CAA GTC CAG ACA CAC CTT CTC ACT CCT
 590 600 610 620 630
 TTT TTT CTC TTT AAC AAG GGA TAT AAA TTA TTG GTG ACA TAT GCT
 640 650 660 670
 GGT TGT TTC CTC TTT TAT TCC TAA AGG ATA ACC TCC AAA TCA CTA
 680 690 700 710 720
 TTT TAA CAG CTT TGG CGT AGG ATC TCA AAA TCA AGT TAA CGG ATG

Figure 8b (1)

730	740	750	760	
↓	↓	↓	↓	
GTA GTT ACA GAT GAG TCA GAA CCA CTT GAT TTG BAC ATA TCA GGT				
770	780	790	800	810
↓	↓	↓	↓	↓
TTT CCC TTG CAA ACC AGC CAA CTG ATT TTT TTT TTT TTT TTT TTT				
820	830	840	850	
↓	↓	↓	↓	
BAG AGA BAG TCT TGC TCT GTT GCC AGG CTA GAG TGC AGT GGC GCG				
860	870	880	890	900
↓	↓	↓	↓	↓
ATA TCG GCT CAC TGC AAC CTC TGC CTC CCG GGT TCA ACC TCA GCC				
910	920	930	940	
↓	↓	↓	↓	
TCT CGA GTA GCT GGG ACT ACT GGC ACA CAC CAC CAT GCC CAG CTA				
950	960	970	980	990
↓	↓	↓	↓	↓
ATT TTT GTA TTT TTA GTA GAG ACA GGG TTT CAC CGT GTT GGC CAG				
1000	1010	1020	1030	
↓	↓	↓	↓	
GGT GGT CTC AAT CTC TTG ACC TCG TGA TCT GCC CGC CTC GNC TCC				
1040	1050	1060	1070	1080
↓	↓	↓	↓	↓
CCA AAG TGC TGG GAT TAC AGG CGT GCN CTG CNC CCG NCC CCT GTT				
1090	1100	1110	1120	
↓	↓	↓	↓	
GAT GTT TTT CCT GTA TTT CTA GGA CAG TAG TTC TCA CTC TGG GCT				
1130	1140	1150	1160	1170
↓	↓	↓	↓	↓
GCA CAT TGG AAT CAC CTG GGT ACT TTA GAA AAC ACT GCT GCC TGC				
1180	1190	1200	1210	
↓	↓	↓	↓	
ATC CCA CCC CTT AAG GGT CTG GTG TAA TTG ACC TGG GGT ACA GCC				
1220	1230	1240	1250	1260
↓	↓	↓	↓	↓
TGG GTG TCA AGA TTT TTG AGC TCT CTC CAG GTG ACT CTG ACC TGC				
1270	1280	1290	1300	
↓	↓	↓	↓	
AGC CAA GGT GAG AGG TAC TGT TCT AGG AGT TTT GCT TTA CTA GCA				
1310	1320	1330	1340	1350
↓	↓	↓	↓	↓
AAA TAT AAA GCT ATA GAA AGC ATC TTT TGT TCC TCA TAG AAA TTA				
1360	1370	1380	1390	
↓	↓	↓	↓	
ATG ATG GGG AGG TGA GCA GAA TAG TCA CTC TGG GCC TAC TCA TGC				
1400	1410	1420	1430	1440
↓	↓	↓	↓	↓

Figure 8b (2)

TGT TTA CAG CAG GTA TAT AGG TTC TAC TAG GGG 08/403260

1450	1460	1470	1480	
*	*	*	*	
GTT CAT AAT ACC TGT GAG AGC AGA TAA CTG AGT GTA TAT AGT GAG				
1490	1500	1510	1520	1530
*	*	*	*	*
GAT TTC CAG GTC ATA GTG AAA GGG CAA GGC ACT AAA ATC ATA GCT				
1540	1550	1560	1570	
*	*	*	*	
TGT CTT GCA TAT ACT GTT TGT TTG TTT TTA GAC TTA CAT GTT AGG				
1580	1590	1600	1610	1620
*	*	*	*	*
TTT CAG TTT ACG TTT TAG GTT CAC AGC AAA ACT GAC CAG AAA GCA				
1630	1640	1650	1660	
*	*	*	*	
CAG AGA GGC ACT TCN ATT TAC CTC CAT TTA CCC CAC ACA GGC ACA				
1670	1680	1690	1700	1710
*	*	*	*	*
TCC TCC CCT ACA GAG TGG TCC ATT TAT TAC AGC TGC TGA ACC CAC				
1720	1730	1740	1750	
*	*	*	*	
ACT GAC ACG CTG TTA TCA CTC AGA GCC TGG CAG TTT ACA GAG GCT				
1760	1770	1780	1790	1800
*	*	*	*	*
CAC TCT CCG NTA TGT GTC CTG TGN TTT GAA CAA ATG TAT AAT GAC				
1810	1820	1830	1840	
*	*	*	*	
TTT ATT CAT TGT TTT TTA ATG AAG CTG ATC TTT TCC CTC TGA AAC				
1850	1860	1870	1880	1890
*	*	*	*	*
TAC AAA ATG AAT TTC TAG CAT AGC CAT AGC AGG TGT CAA GCT ATA				
1900	1910	1920	1930	
*	*	*	*	
CTA CTA GGT AAA TTT TAA GAA ATG CCC AAC TTT ATC ATA TTT GCA				
1940	1950	1960	1970	1980
*	*	*	*	*
TTT CAA AAT ATG ATT AAT CAC ACA TAG GAT TTT GTT TCT TCA TGC				
1990	2000	2010	2020	
*	*	*	*	
CTA CAG CAA ATA GAA ATA AAG TGC AAG AAA CTT TTC TGA GGC AAA				
2030	2040	2050	2060	2070
*	*	*	*	*
GCT TTC ACT TTG TGA ACG TAA AAT GTT GAC TCT AAT ATT TTC CAT				
2080	2090	2100	2110	
*	*	*	*	
ACT GTA GTA TAT GTG TGT GTA TTA TGT GAG GAT TCA TAG TCT GCT				
2120	2130	2140	2150	2160

Figure 8b (3)

CTT ACT TTT TTA TAG TAG CTA AGA ATT ATT ATA ATC GCT ATA AGC
 2170 2180 2190 2200
 AGA AAC AAT TAT TCT TAA CAA AAT GAA TAC ACA CAA GAA AAG CTT
 2210 2220 2230 2240 2250
 TAG TTT AGC TAT TAG AAC TAA CTC TAT AAT TAT GAT AAC CAT GAG
 2260 2270 2280 2290
 ATG CTG GAA CAG GAG CCA GCA GAA GCC ACA GCC CTC TGA TAT TAA
 2300 2310 2320 2330 2340
 TAT ATA AAG AAA CCA AAA TCT GCT TGT TAA ACT GAG GCA GTT GTA
 2350 2360 2370 2380
 TGG ATA CTT CAA CCT GAA AAT GCC CCC TTC TTC CTG AAA CAG AAC
 2390 2400 2410 2420 2430
 ATT TAA TAA AAA TGG CAT GCT TGG ACA GGA ATT TCT TTT TTA AAA
 2440
 AAT GCT TAG TTT TTA TG

ATT TAT CTC CTA GAT ACA CCA A GA CTG CCA CCA
 50 60 70 80 90
 TCT ACA TTT TCA ACC TTG CTC TGC AGA TGC CTT AGC CAC CAG TAC
 100 110 120 130
 CCT GCC CTT CCA GAG TGT GAA TTA CCT AAT GGG AAC ATG GCC ATT
 140 150 160 170 180
 TGG AAC CAT CCT TTG CAA GAT AGT GAT CTC CAT AGA TTA CTA TAA
 190 200 210 220
 CAT GTT CAC CAG CAT ATT CAC CCT CTG CAC CAT GAG TGT TGA TCG
 230 240 250 260 270
 ATA CAT TGC AGT CTG CCA CCC TGT CAA GGC CTT AGA TTT CCG TAC
 280 290 300 310
 TCC CCN NNN NNN NNN NNN NNN NNN NNN NNN NNN NNN NNN NNN
 320 330 340 350 360
 NNN NNN NNN NNN NNN NNN NNN NNN NNN NNN NNN NNN NNN NNN
 370 380 390 400
 NNN NNN NNG TTC CAT AGA TTG TAC ACT AAC ATT CTC TCA TCC AAC
 410 420 430 440 450
 CTG GTA CTG GGA AAA CCT GCT GAA GAT CTG TGT TTT CAT CTT CGC
 460 470 480 490
 CTT CAT TAT GCC AGT GCT CAT CAT TAC CGT GTG CTA TGG ACT GAT
 500 510 520 530 540
 GAT CTT GCG CCT CAA GAG TGT CCG CAT GCT CTC TGG CTC CAA AGA
 550 560 570 580
 AAA GGA CAG GAA TCT TCG AAG GAT CAC CAG GAT GGT GCT GGT GGT
 590 600 610 620 630
 GGT GGC TGT GTT CAT CGT CTG CTG GAC TCC CAT TCA CAT TTA CGT
 640 650 660 670
 CAT CAT TAA AGC CTT GGT TAC AAT CCC AGA AAC TAC GTT CCA GAC
 680 690 700 710 720
 TGT TTC TTG GCA CTT CTG CAT TGC TCT AGG TTA CAC AAA CAG CTG
 730 740 750 760
 CCT CAA CCC AGT CCT TTA TGC ATT TCT GGA TGA AAA CTT CCA CGA
 770 780 790 800 810
 TGC TTC AGA GAG TTC TGT ATC CCA ACC TCT TCC AAC ATT GAG CAA
 820 830
 CAA AAC TCC ACT CGA ATT CC

Figure 8c

	10		20		30		40
	*		*		*		*
GGG	TAC	CGG	GCC	CCC	CCT	CGA	GGT
	50		60		70		80
	*		*		*		*
TAT	CGA	ATT	CTT	ACT	GAA	TTA	GGT
	100		110		120		130
	*		*		*		*
TAA	AAA	AAA	TGA	AAA	GGC	AGA	AAA
	140		150		160		170
	*		*		*		*
ACT	CTT	CCG	TCC	ATC	ACC	ATT	GAC
	190		200		210		220
	*		*		*		*
AGG	TAG	TTG	AGC	AAT	ATG	AAG	GCC
	230		240		250		260
	*		*		*		*
ACA	CAC	ACA	CAC	ACA	CAC	ACA	CAT
	280		290		300		310
	*		*		*		*
TGT	CCT	TCC	TCC	TCT	CAC	TCT	CTT
	320		330				
	*		*				
TGA	GAC	ACG	ATC	ACC	AC		

Figure 8d

```

      10      20      30      40
      *      *      *      *
CGG ATC CTT AGC ATC CCC AAA GCG CCT CCG TGT ACT TCT AAG GTG

      50      60      70      80      90
      *      *      *      *      *
GGA GGG GGA TAC AAG CAG AGG AGA ATA TCG GAC GCT CAG ACG TTC

      100     110     120     130
      *      *      *      *
CAT TCT GCC TGC CGC TCT TCT CTG GTT CCA CTA GGG CTT GTC CTT

      140     150     160     170     180
      *      *      *      *      *
GTA AGA AAC TGA CCG AGC CTA GGG CAG CTG TGA GAG GAA GAG GCT

      190     200     210     220
      *      *      *      *
GGG GCG CCT GGA ACC CGA ACA CTC TTG AGT GCT CTC AGT TAC AGN

      230     240     250     260     270
      *      *      *      *      *
CTA CCG AGT CCG CAG GAA GCA TTC AGA ACC ATG GAC AGC AGC GCC

      280     290     300     310
      *      *      *      *
GGC CCA GGG AAC ATC AGC GAC TGC TCT GAC CCC TTA GCT CCT GCA

      320     330     340     350     360
      *      *      *      *      *
AGT TGC TCC CCA GCA CCT GGC TCC TGG CTC AAC TTG TCC CAC GTT

      370     380     390     400
      *      *      *      *
GAT GGA AAC CAG TCC GAC CCA TGC GGT CCT AAC CCG ACG GGC CTT

      410     420     430     440     450
      *      *      *      *      *
GGC GGG AAC GAC AGC CTG TGC CCT CAG ACC GGC AGC CCT TCC ATG

      460     470     480     490
      *      *      *      *
GTC ACA GCC ATC ACC ATC ATG GCC CTC TAT TCT ATC GTG TGT GTA

      500     510     520     530     540
      *      *      *      *      *
GTG GGC CTC TTT GGA AAC TTC CTG GTC ATG TAT GTG ATT GTA AGA

      550     560     570     580
      *      *      *      *
TAT ACC AAA ATG AAG ACT GCC ACC AAC ATC TAC ATT TTC AAC CTT

      590     600     610     620     630
      *      *      *      *      *
GCT CTG GCA GAT GCC TTA GCC ACT AGC ACG CTG CCC TTT CAG AGT

      640     650     660     670
      *      *      *      *
GTT AAC TAC CTG ATG GGA ACG TGG CCC TTT GGA AAC ATC CTC TGC

      680     690     700     710     720
      *      *      *      *      *
AAG ATC GTG ATC TCA ATA GAC TAC TAC AAC ATG TTC ACC AGT ATC

```

Figure 9 (1)

```

      730      740      750      760
      *      *      *      *
TTC ACC CTC TGC ACC ATG AGT GTA GAC CGC TAC ATT GCC GTC TGC
      770      780      790      800      810
      *      *      *      *      *
CAC CCG GTC AAG GCC CTG GAT TTC CGT ACC CCC CGA AAT GCC AAA
      820      830      840      850
      *      *      *      *
ATT GTC AAT GTC TGC AAC TGG ATC CTC TCT TCT GCC ATT GGT CTG
      860      870      880      890      900
      *      *      *      *      *
CCC GTA ATG TTC ATG GCA ACC ACA AAA TAC AGG CAG GGG TCC ATA
      910      920      930      940
      *      *      *      *
GAT TGC ACC CTC ACG TTC TCT CAT CCC ACA TGG TAC TGG GAG AAC
      950      960      970      980      990
      *      *      *      *      *
CTG CTC AAA ATC TGT GTC TTC ATC TTC GCC TTC ATC ATG CCG GGC
      1000      1010      1020      1030
      *      *      *      *
CTC ATC ATC ACT GTG TGT TAT GGA CTG ATG ATC TTA CAG CTC AAG
      1040      1050      1060      1070      1080
      *      *      *      *      *
AGT GTC CGC ATG CTG TCG GGC TCC AAA GAA AAG GAC AGG AAC CTG
      1090      1100      1110      1120
      *      *      *      *
CGC AGG ATC ACC CGG ATG GTG CTG GTG GTC GTG GCT GTA TTT ATT
      1130      1140      1150      1160      1170
      *      *      *      *      *
GTC TGC TGG ACC CCC ATC CAC ATC TAT GTC ATC ATC AAA GCA CTG
      1180      1190      1200      1210
      *      *      *      *
ATC ACG ATT CCA GAA ACC ACT TTC CAG ACT GTT TCC TGG CAC TTC
      1220      1230      1240      1250      1260
      *      *      *      *      *
TGC ATT GCC TTG GGT TAC ACA AAC AGC TGC CTG AAC CCA GTT CTT
      1270      1280      1290      1300
      *      *      *      *
TAT GCG TTC CTG GAT GAA AAC TTC AAA CGA TGT TTT AGA GAG TTC
      1310      1320      1330      1340      1350
      *      *      *      *      *
TGC ATC CCA ACT TCC TCC ACA ATC GAA CAG CAA AAC TCT GCT CGA
      1360      1370      1380      1390
      *      *      *      *
ATC CGT CAA AAC ACT AGG GAA CAC CCC TCC ACG GCT AAT ACA GTG
      1400      1410      1420      1430      1440
      *      *      *      *      *

```

Figure 9 (2)

GAT CGA ACT AAC CAC CAG CTA GAA AAT CTG GAA GCA GAA ACT GCT
 1450 1460 1470 1480
 CCA TTG CCC TAA CTG GGT CCC ACG CCA TCC AGA CCC TCG CTA AAC
 1490 1500 1510 1520 1530
 TTA GAG GCT GCC ATC TAC TTG GAA TCA GGT TGC TGT CAG GGT TTG
 1540 1550 1560 1570
 TGG GAG GCT CTG GTT TCC TGG AAA AGC ATC TGA TCC TGC ATC ATT
 1580 1590 1600 1610 1620
 CAA AGT CAT TCC TCT CTG GCT ATT CAC GCT ACA CGT CAG AGA CAC
 1630 1640 1650 1660
 TCA GAC TGT GTC AAG CAC TCA GAA GGA AGA GAC TGC AGG CCA CTA
 1670 1680 1690 1700 1710
 CTG AAT CCA GCT CAT GTA CAG AAA CAT CCA ATG GAC CAC AAT ACT
 1720 1730 1740 1750
 CTG TGG TAT GTG ATT TGT GAT CAA CAT AGA AGG TGA CCC TTC CCT
 1760 1770 1780 1790 1800
 ATG TGG AAT TTT TAA TTT CAA GGA AAT ACT TAT GAT CTC ATC AAG
 1810 1820 1830 1840
 GGA AAA ATA GAT GTC ACT TOT TAA ATT CAC TOT AGT GAT GCA TAA
 1850 1860 1870 1880 1890
 AGG AAA AGC TAC CTC TGA CCT CTA GCC CAG TCA CCC TCT ATG GAA
 1900 1910 1920 1930
 AGT TCC ATA GGG AAT ATG TGA GGG AAA ATG TTG CTT CCA AAT TAA
 1940 1950 1960 1970 1980
 ATT TTC ACC TTT ATG TTA TAG TCT AGT TAA GAC ATC AGG GGC ATC

T

Figure 9 (3)

HIGH HOMOLOGY BETWEEN DELTA, MU AND KAPPA OPIOID RECEPTORS

		10	20	30	40	50
DOR-1						
		MELWPSARAELQSSPLVNLSDAFPSAFPSAGANASGSPGARSASSLALAI				
rMORa	10	20	30	40	50	60
	mdsstgpgntscdscdplaqaascspapgswlnlshvdgNqSDpcglnrtglGgNdSlcPqt-gspSmvTAI>					
rKORa	10	20	30	40	50	60
	mespiqifrgdpgptcspacilpnssswfpnwaedsngsvgsedqqlesahISpAlpV>					
	60	70	80	90	100	110
DOR-1						
	<u>AITALYSAVCAVGLLGNVLLMEGLIRYTKLKTATNIYIENLALADALATSTLPFQSAKYLMETWPFGEILL</u>					
rMORa	70	80	90	100	110	120
	<u>ITMALYSIVCVGLLGNVLLMEGLIRYTKLKTATNIYIENLALADALATSTLPFQSVNLYMGTPFGEILL</u>					
rKORa	70	80	90	100	110	120
	<u>ITAVYSVVFVGLLGNVLLMEGLIRYTKLKTATNIYIENLALADALATSTLPFQSAVYLMNSWPFGEILL</u>					
	130	140	150	160	170	180
DOR-1						
	<u>CKAVLSIDVYNMETSIFTLTMSVDRYIAVCHPVKALDFRTPAKAKLINICIWVLASGVGVPIVMVAITQ</u>					
rMORa	140	150	160	170	180	190
	<u>CKIIVISIDVYNMETSIFTLTMSVDRYIAVCHPVKALDFRTPRNAKIYNVCNWLISAIIGLPVFMFMAITK></u>					
rKORa	140	150	160	170	180	190
	<u>CKIIVISIDVYNMETSIFTLTMSVDRYIAVCHPVKALDFRTPIKAKIINICINILASSVGISAIIVLGGITK></u>					
	200	210	220	230	240	250
DOR-1						
	<u>PRDGAVVCMQLQFSPSPSWYWDVTVKICVFLEAFVVPILIIITVCYGLMLLRRLSVRLLSGSKEKDRSLRRIT</u>					
rMORa	210	220	230	240	250	260
	<u>YRQGSIDCtLtFshPtWYwenllKICVFLEAFVVPILIIITVCYGLMLLRRLKSVRLLSGSKEKDRSLRRIT></u>					
rKORa	210	220	230	240	250	260
	<u>YREDVIECSLQFPDDEW-WDlFMKICVFLEAFVVPILIIITVCYGLMLLRRLKSVRLLSGSKEKDRSLRRIT></u>					
	270	280	290	300	310	320
DOR-1						
	<u>RMVLVVVGAFVVCWAPIHIFVIVWTLVDINRRDPLVVAALHLCIALGYANSSLNPNVLYAFLDENFKRCFR</u>					
rMORa	280	290	300	310	320	330
	<u>RMVLVVVGAFVVCWAPIHIFVIVWTLVDINRRDPLVVAALHLCIALGYANSSLNPNVLYAFLDENFKRCFR></u>					
rKORa	280	290	300	310	320	330
	<u>KLVLVVVGAFVVCWAPIHIFVIVWTLVDINRRDPLVVAALHLCIALGYANSSLNPNVLYAFLDENFKRCFR></u>					
	340	350	360	370		
DOR-1						
	<u>QLCRTPCGRQEPGSLRRPRQATTREVRVTACTPSDGPGGGAAA</u>					
rMORa	350	360	370	380		
	<u>EFCIPTSSSTIEQQNSTRVQR-nTREHPSTANTVDRTNHQLENLEAETAPLP</u>					
rKORa	350	360				
	<u>DFCFPIKMRMERQSTNRVRN-TVQDPASMRDVGGMNKPV></u>					

Identical amino acids between DOR-1 and mu and kappa receptors in upper case
 Predicted transmembrane domains are underlined

Figure 10

Sequence Range: 1 to 1805

START CODON
↓
GGC AGT GGC ATG GAG CCC CTC TTC CCC GCG CCG TTC TGG GAG GTT ATC TAC GGC 54
AGC CAC CTT CAG GGC AAC CTG TCC CTC CTG AGC CCC AAC CAC AGT CTG CTG CCC 108
CCG CAT CTG CTG CTC AAT GCC AGC CAC GGC GCC TTC CTG CCC CTC GGG CTC AAG 162
GTC ACC ATC GTG GGG CTC TAC CTG GCC GTG TGT GTC GGA GGG CTC CTG GGG AAC 216
TGC CTT GTC ATG TAC GTC ATC CTC AGG CAC ACC AAA ATG AAG ACA GCC ACC AAT 270
ATT TAC ATC TTT AAC CTG GCC CTG GCC GAC ACT CTG GTC CTG CTG ACG CTG CCC 324
TTC CAG GGC ACG GAC ATC CTC CTG GGC TTC TGG CCG TTT GGG AAT GCG CTG TGC 378
AAG ACA GTC ATT GCC ATT GAC TAC TAC AAC ATG TTC ACC AGC ACC TTC ACC CTA 432
ACT GCC ATG AGT GTG GAT CGC TAT GTA GCC ATC TGC CAC CCC ATC CGT GCC CTC 486
GAC GTC CGC ACG TCC AGC AAA GCC CAG GCT GTC AAT GTG GCC ATC TGG GCC CTG 540
GCC TCT GTT GTC GGT GTT CCC GTT GCC ATC ATG GGC TCG GCA CAG GTC GAG GAT 594
GAA GAG ATC GAG TGC CTG GTG GAG ATC CCT ACC CCT CAG GAT TAC TGG GGC CCG 648
GTG TTT GCC ATC TGC ATC TTC CTC TTC TCC TTC ATC GTC CCC GTG CTC GTC ATC 702
TCT GTC TGC TAC AGC CTC ATG ATC CGG CGG CTC CGT GGA GTC CGC CTG CTC TCG 756
GGC TCC CGA GAG AAG GAC CGG AAC CTG CGG CGC ATC ACT CGG CTG GTG CTG GTG 810

864
 * * * * *
 GTA GTG GCT GTG TTC GTG GGC TGC TGG ACG CCT GTC CAG GTC TTC GTG CTG GCC
 918
 * * * * *
 CAA GGG CTG GGG GTT CAG CCG AGC AGC GAG ACT GCC GTG GCC ATT CTG CGC TTC
 972
 * * * * *
 TGC ACG GCC CTG GGC TAC GTC AAC AGC TGC CTC AAC CCC ATC CTC TAC GCC TTC
 1026
 * * * * *
 CTG GAT GAG AAC TTC AAG GCC TGC TTC CGC AAG TTC TGC TGT GCA TCT GCC CTG
 1080
 * * * * *
 CGC CGG GAC GTG CAG GTG TCT GAC CGC GTG CGC AGC ATT GCC AAG GAC GTG GCC
 1134
 * * * * *
 CTG GCC TGC AAG ACC TCT GAG ACG GTA CCG CGG CCC GCA **TGA** CTA GGC GTG GAC
 ← STOP CODON 1188
 * * * * *
 CTG CCC ATG GTG CCT GTC AGC CCG CAG AGC CCA TCT ACG CCC AAC ACA GAG CTC
 1242
 * * * * *
 ACA CAG GTC ACT GCT CTC TAG GCG GAC ACA CCC TGG GCC CTG AGC ATC CAG AGC
 1296
 * * * * *
 CTG GGA TGG GCT TTT CCC TGT GGG CCA GGG ATG CTC GGT CCC AGA GGA GGA CCT
 1350
 * * * * *
 AGT GAC ATC ATG GGA CAG GTC AAA GCA TTA GGG CCA CCT CCA TGG CCC CAG ACA
 1404
 * * * * *
 GAC TAA AGC TGC CCT CCT GGT GCA GGG CCG AGG GGA GAC AAG GAC CTA CCT GGA
 1458
 * * * * *
 AGC AGC TGA CAT GCT GGT GGA CGG CCG TTA CTG GAG CCC GTG CCC CTC CCT CCC
 1512
 * * * * *
 CGT GCT TCA TGT GAC TCT TGG CCT CTC TGC TGC TGC GTT GGC AGA ACC CTG GGT
 1566
 * * * * *
 GGG CAG GCA CCC GGA GGA GGA GCA GCA GCT GTG TCA TCC TGT GCC CCC CAT GTG
 1620
 * * * * *
 CTG TGT GCT GTT TGC ATG GCA GGG CTC CAG CTG CCT TCA GCC CTG TGA CGT CTC
 1674
 * * * * *

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hORL-1 Duano Sequence

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CTC AGG GCA GCT GGA CAG GCT TGG CAC GGC CCG GGA AGT GCA GCA GGC AGC TTT

1728

* * * * *
TCT TTG GGG TGG GAC TTG CCC TGA GCT TGG AGC TGC CAC CTG GAG GAC TTG CCT

1782

* * * * *
GTT CCG ACT CCA CCT GTG CAG CCG GGG CCA CCC CAG GAG AAA GTG TCC AGG TGG* * *
GGG CTG GCA GTC CCT GGC TGC AG

```

                                10      20      30      40      50      60
hMOR  MDSSAAPTYASVCTDALAYSSCSPAPSPGSMVYLSHLDGYLSDPCGPVRTNLGGRDSLCPPTGSP
                                ↑g
hDOR  mePAPSaGaelq-pplfaYaSDaysacpsaGaYaSgpParsas
mKOR  mespiqifrgdpgptcspSaC-llPYssSWfp-nwaesdsYgsvGsedqqLes-ahi-sP-aiP
                                ↑ev
ORL1  meplfPaP-fWiygSHLqGYLSll-sPYhslLpphlllYashGal
ORL2  meeggdfdnyyygadYqSeCeyTdwk

    •70•••••80•••••90••••• 100    ••110•••••120    130
hMOR  SMITAITIMALYSIVCVVGLFGNFLVMYIVRYTKMKTATNIYIFNLALADALATSTLPFQSVNY
hDOR  SlalAIaItALYSaVCaVGLIGNvLVMfgIVRYTKMKTATNIYIFNLALADALATSTLPFQSakY
mKOR  -vI--IT--AvYSVFVVGLVGNsLVMFVIIRYTKMKTATNIYIFNLALADALvTtTmPFQSavY
ORL1  plglkvTivgLYlaVCVgGLIGNcLVMYIIRhTKMKTATNIYIFNLALADtLvllTLPFQSgtdi
                                ↑e
ORL2  S-sgAl-IpAiYmlVfLlgttGNgLVlwtvFRSsrkrrrsadIfIasLAvADltfvvTLPlatyTY

    140    ••150•••••160••••• 170    180    190•••••
hMOR  LMGTWPFGTLCKIVISIDYYNMFTSIFTLtMSVDRYIAVCHPVKALDFRIPRNAKIIINCMMI
hDOR  LMeTWPFGellCKaVLSIDYYNMFTSIFTLtMSVDRYIAVCHPVKALDFRTPakAKIINICiWv
mKOR  LMnsWPFGdvlCKIVISIDYYNMFTSIFTLtMSVDRYIAVCHPVKALDFRTPLAKIINICiWl
ORL1  LIGFWPFGGnaLCKtVlaIDYYNMFTStFTLtMSVDRYVAiCHPIRALDvRTSSgAqavNVaiWa
ORL2  rdydNPFGTffCKLssyliFvNMYaSvFcltglSfDRYIAivRPVanarIRlrvsgavatavilWv

    ••200•••••210    220    230    ••240•••••250•••••260
hMOR  LSSAIGLPVNFMATTKYRQGSIDCTLTFSHPTWYENLVKICVFIFAFIMPVLIITVCYGLMILR
hDOR  LaSgvGvPiMvMAVTrpRdGavvCmlqFpsPSWYndvtvKICVFIFAFvPILIIITVCYGLMILR
                                ↑dv
                                ↑ys
mKOR  LaSsvGisaivlggTKvRedvIeCslqFpddW-WdlfmKICVfVFAFviPVLIIIVCYtLMILR
hORL1 LaSvvGvPVaiMgsaqvedeeIeClveiptPqdYWgvpfaICiFlFsFivPVLvIsVCYsLMiR
                                ↑r
                                ↑k
                                ↑mvatv
hORL2 LaallamPVMvltTgdlenttvqCymdySsseWaWEvglgvssttvgFvvPftImItCY-ffIaq

    270    280    •••••290•••••300•    310    ••320•••••
hMOR  LKSVRMLSGSKEKDRNLRRIRMVLVVAVFIVCWTPIHIVIIKALVTIPETTFQTVSWHFCIA
                                ↑d
hDOR  LrSVRLLSGSKEKDRsLRRIRMVLVVgaFvWCWaPIHIFVIwtLVdIrrdplvvaalHICIA
mKOR  LKSVRLLSGSrEKDRNLRRIRMVLVVAVFIICWTPIHIFilveALgstshsTaalsSyyFCIA
ORL1  LrgVRLLSGSrEKDRNLRRIRMVLVVAVFvqCWTPVqvFVlaagLgvaPssetavairFCtA
                                ↑lvkt
                                ↑f
ORL2  tiaghfrkeriEglRkrRRllgiivVlVvtFalCWmPyHlYmlgslLhwpccddlFlmnifpyCtc

    ••330•••••340    350    360    370    380    390
hMOR  LGYTNSCLNPVLYAFLDENFKRCFREFCIPTSSNIEQQNSTRIRQMIRDPSTANTVDRTNHQLE
hDOR  LGYaNSsLNPVLYAFLDENFKRCFRqlCrkpcgrpdpssfsRaReaIaerervTActpsdggpgggga
mKOR  LGYTNSsLNPVLYAFLDENFKRCFRdFCFPlkmmErQstnRvR-NTvqdPasmrdVggmnkpv
ORL1  LGYvNSCLNPiLYAFLDENFKaCFRkFCasalrrdvQvSdRvRgiakDvalackTsetvprpa
                                ↑q
ORL2  isYvNSCLNPFLYAFFDprFraCtsmlCcgqSrcagtshSssgeksasyssghsagpgpnmgkgg

    400.
hMOR  NLEAETAPLP
h-DOR aa
ORL2  eqmheksipysqetlvvd
12.

```

Fig. 1. COMPARISON OF ORL1 & ORL2 PROTEIN SEQUENCES WITH μ , δ & κ RECEPTORS
Regions overscored with ••••• represent predicted transmembrane domains. The symbol ^Y represents extracellular Asn residues that are consensus sites for N-linked glycosylation. Consensus PKA/PKC sites are underlined. The Genbank references are: for hMOR (Human mu receptor), Wang et al., Accession# L25119; for hDOR (human delta opioid receptor) Simonin et al., Accession# U10504; and for mKOR (murine kappa opioid receptor), Yasuda et al., Accession# L11065.